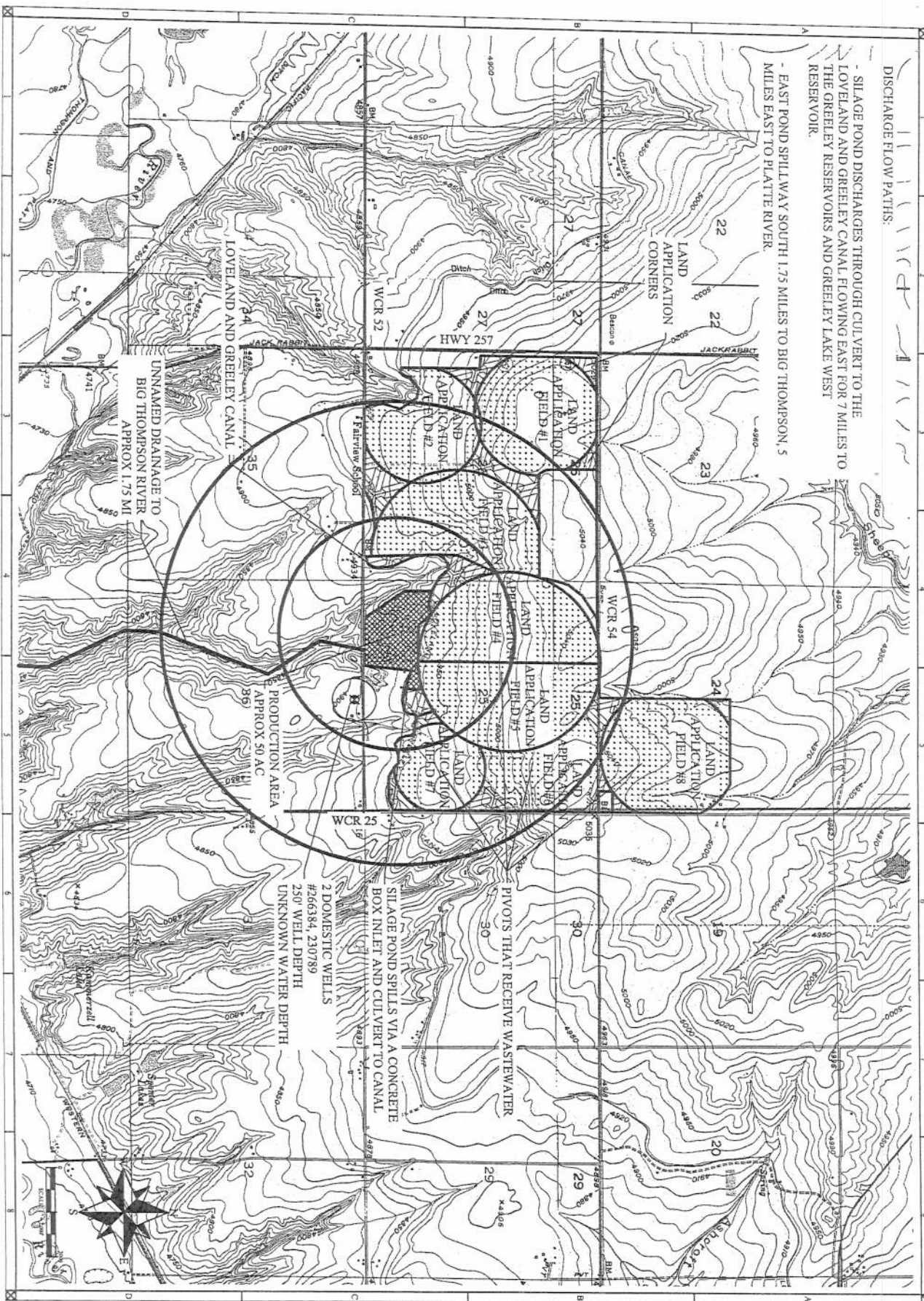


APPENDIX A

NUTRIENT MANAGEMENT PLAN TERMS (1 – 6)

1) LAND APPLICATION FIELD MAPS



BOOTH LIVESTOCK, MILLIKEN ATTACHMENT A, LOCATION MAP

SECTION 25 AND, SE 1/4 OF SECTION 24, TOWNSHIP 5N, RANGE 67W OF THE 6TH P.M.,
COUNTY OF WELD, STATE OF COLORADO.

AGPRO LANDPRO

4350 Highway 66, Longmont, CO 80504
(970) 535-9318 • fax: (970) 535-9854

| NO. | DATE | DESCRIPTION |
|-----|---------|----------------|
| 1 | 10/1/01 | INITIAL DESIGN |
| 2 | 10/1/01 | FINAL DESIGN |
| 3 | 10/1/01 | CONSTRUCTION |
| 4 | 10/1/01 | MAINTENANCE |
| 5 | 10/1/01 | REPAIRS |
| 6 | 10/1/01 | REPLACEMENT |
| 7 | 10/1/01 | RENOVATION |
| 8 | 10/1/01 | RECONSTRUCTION |
| 9 | 10/1/01 | DEMOLITION |
| 10 | 10/1/01 | DISPOSAL |

APPENDIX B

NUTRIENT MANAGEMENT PLAN TERMS

2) LAND APPLICATION INFORMATION

NMP TERMS - 2) LAND APPLICATION FIELDS

All land application fields are listed below.

Table B-1 – Land Application Fields

| Field Identification | Latitude ¹ | Longitude ² | Spreadable Acres ³ |
|----------------------|------------------------|------------------------|-------------------------------|
| Field 1 | 40.374434 | -104.864990 | 141 |
| Field 2 | 40.367210 | -104.864280 | 103 |
| Field 3 | 40.369462 | -104.853476 | 146 |
| Field 4 | 40.372868 | -104.844209 | 143 |
| Field 5 | 40.372199 | -104.841487 | 146 |
| Field 6 | 40.374890 | -104.835326 | 82 |
| Field 7 | 40.367975 | -104.836078 | 69 |
| Field 8 | 40.381788 | -104.837331 | 130 |
| Corners | Associated with fields | | 114 |
| | | | |

¹Enter latitude in decimal degrees.

²Enter longitude in decimal degrees [number should be negative (eg. -104.3315)].

³Field acreages reduced by any setbacks, buffers, or otherwise unspreadable areas.

NMP TERMS - 2) LAND APPLICATION CROPS

Potential crops or other uses for each land application field are listed below. Crops in the 5 year rotation are listed per field. Additional crops that might possibly be grown on the operation are listed as field "all".

Table –B-2 – Potential Land Application Field Crops

| Field Identification | Crop | Realistic Yield Goal | Yield Unit (bushels, tons, etc.) | Source (see Appendix C) |
|----------------------|--------------------|----------------------|----------------------------------|-------------------------|
| 1-8 | Corn | 238 | bu | farm |
| All | Corn Silage | 28 | tons | farm |
| 1-8 | Alfalfa | 5.23 | tons | farm |
| All | Sorghum silage | 20 | Tons | County Stats, Calc |
| All | Sorghum grain | 65 | Bu | County Stats |
| All | Sorghum hay | 5 | Tons | County stats, Calc |
| All | Sudex silage | 10 | Tons | CSU FS |
| All | Sudex hay | 5 | Tons | CSU FS |
| All | Triticale silage | 12 | Tons | County Stats, Calc |
| All | Triticale hay | 5 | Tons | County Stats, Calc |
| All | Wheat silage | 12 | Tons | County Stats, Calc |
| All | Wheat hay | 5 | Tons | County Stats, Calc |
| All | Winter wheat grain | 71 | Bu | County Stats |
| All | Spring wheat grain | 62 | Bu | County Stats |
| All | Oat silage | 14 | Tons | County Stats, Calc |
| All | Oat hay | 5.2 | Tons | County Stats, Calc |
| All | Oat grain | 91 | Bu | County Stats |
| All | Pasture/grass/hay | 4.7 | Tons | County Stats |
| All | Sugar Beets | 30.1 | Tons | County Stats |
| All | Millet | 35 | Bu | State Stats |
| All | Sunflower | 1348 | Lbs | County Stats |
| All | Dry Beans | 2255 | Lbs | County Stats |

DL = dryland, Irr = irrigated, dc = double cropped

APPENDIX C

NUTRIENT MANAGEMENT PLAN TERMS

3) EXPECTED CROP YIELD INFORMATION

Yield goals are based upon a variety of sources and are indicated in Table B-2:

Field: an average of the last 5 years of suitable data, plus 10%. Years where yields were affected by drought, hail, insufficient nutrient availability or water, or other problems which would cause unnatural yield loss will not be included.

Farm: where a 5 year average does not exist but data from surrounding fields which are of similar productivity do exist, these yields will be included in the 5 year average. This is also the case where a whole farm yield is monitored rather than yields on individual fields. Where data on individual fields is kept but yield is similar across the farm, the data may be pooled together for simplicity.

Where a 5 year average has not been determined, one of several methods for determining yield goal, depending upon the availability of information, will be used.

- County or State Stats - Ag statistics for the county and crop – 5 years of data + 10%
- AGPRO - data from nearby farms, 5 years + 10%
- CES-FS - Cooperative Extension bulletin 568A or a production publication plus 10%

Calc: calculations will be used if a grain yield goal is known but not a forage yield goal for the same crop, based upon the following data:

Olsen Lab – “Guidelines for Fertilizer Recommendations, Plant Tissue Analysis, and Water Analysis”
(available at their website www.olsenlab.com)

Oat hay yield goal (t/a) x 17.5 = grain yield goal (bu/a)

Forage sorghum yield goal (t/a) x 20 = grain yield

Sorghum silage yield goal (t/a) x 6 = grain yield

Servi-Tech Lab (Crop File 1.02.022 attached)

Corn silage yield goal (t/a) x 7.5 = grain yield, although this will vary with moisture and quality.

Small grain hay (t/a) x 14 = grain yield

Small grain silage (t/a) x 6 = grain yield

Triticale yields will be based upon potential wheat yield if Triticale yields are not known (KSU fact sheet MF-2227)

3) CROP YIELD INFORMATION REALISTIC YIELD GOAL

Corn:

| | |
|----------------|-----------------|
| 2007 | no data |
| 2008 | no corn |
| 2009 | 216.5 bu |
| 2010 | 219 bu |
| 2011 | 214.8 bu |
| Average | 216.7 bu |
| +10% | 238.4 bu |

Corn Silage:

| | |
|----------------|--------------------|
| 2007 | 23.21 tn/ac |
| 2008 | 20.66 tn/ac |
| 2009 | 29.42 tn/ac |
| 2010 | 27.35 tn/ac |
| 2011 | 25.68 tn/ac |
| Average | 25.26 tn/ac |
| +10% | 27.79 tn/ac |

Alfalfa:

| | |
|----------------|-------------------|
| 2007 | 4.439 tn/ac |
| 2008 | 4.230 tn/ac |
| 2009 | 4.564 tn/ac |
| 2010 | 5.490 tn/ac |
| 2011 | 5.056 tn/ac |
| Average | 4.76 tn/ac |
| +10% | 5.23 tn/ac |

4) NUTRIENT BUDGET INFORMATION (yield goals are presented in Appendices B and C)

Cooperative Extension Nutrient Budget Information:

| Crop: | Manure and Process Wastewater Application Rate Calculated Using: | Description of Method to be Used (calculation, look-up table, etc.): |
|-----------------------------------|--|--|
| Corn Silage | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $35 + (7.5 * YG \text{ (tons/a)})$ Tables 7A-8 CSU Bulletin #568A |
| Corn Grain | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $35 + (1.2 * YG \text{ (bu/acre)})$ Tables 7b. CSU Bulletin #568A |
| Sorghum Silage | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $9 * YG \text{ (tons/A)}$ Tables 7d. CSU Bulletin #568A |
| Sorghum Grain | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $1.2 * YG \text{ (lbs/A)}$ Tables 7c. CSU Bulletin #568A |
| Triticale Hay & Silage | <input type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input checked="" type="checkbox"/> Department-approved Method | $\text{yield goal (lbs/a DM)} * (\% \text{ protein} / 6.25 / 100) / .66$ multiply silage yield by 0.4 to get dry matter of silage N content/efficiency use factor Where protein is not known, 9% is used (KSU Bulletin MF-2227) |
| Oat Hay & Silage | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $YG \text{ (tons wet)} * 2000 \text{ lb/t} * 1.6\% \text{ N} / 100$ Multiply silage yield by 0.4 to get dry matter of silage Crop removal CSU 568A. |
| Spring Seeded Small Grain | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $125 \text{ lbs N per } 100 \text{ bu/A, minus } 20 \text{ lb N/a for each } 10 \text{ bu/A difference}$ CSU Do-It-Yourself Manure Mgt Plan |
| Winter Wheat Grain | <input type="checkbox"/> CSUCE Published Fertilizer Suggestions <input checked="" type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $YG \text{ (bu/a)} * 1.75$ KSU Bulletin C-529 Wheat Production Handbook, 1997 |

4) NUTRIENT BUDGET INFORMATION

Cooperative Extension Nutrient Budget Information:

| Crop: | Manure and Process Wastewater Application Rate Calculated Using: | Description of Method to be Used (calculation, look-up table, etc.): |
|--|---|--|
| Wheat Silage | <input type="checkbox"/> CSUCE Published Fertilizer Suggestions <input checked="" type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | Convert yield to grain and fertilize as for grain KSU Bulletin MF-1072 Small Grain Cereals for Forage |
| Alfalfa | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $((YG*2000)*(\% \text{ Protein}/6.25)*(\text{soil factor}))/0.66$ Soil factor 0.5-0.7 for sandy to clay soil, respectively CSU Soil Publication #0.565 & 0.566 |
| Sudangrass/ Sudex Hay | <input type="checkbox"/> CSUCE Published Fertilizer Suggestions <input checked="" type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $YG (\text{tons/a DM}) * 40 \text{ lbs N/ton}$ KSU Bulletin MF-1036 |
| Sunflowers | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input checked="" type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $YG (\text{lb/a}) * 0.065 \text{ lbs N/lb grain}$ High Plains Sunflower Production Handbook |
| Grass/hay | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $185 \text{ lbs N/ton} - 40 \text{ lbs N per ton for each ton yield goal less than a 4 ton yield goal}$ $(\text{N credit to } 1' \text{ soils sample})$ Reference is CSU 568A. |
| Small grain pasture and grain | <input checked="" type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input type="checkbox"/> Department-approved Method | $(\text{animals/acre}) \times \text{expected weight gain (lb/hd)} \times 0.4 = \text{lbs N/a}$ OR $(\text{Winter wheat recommendation plus } 30\text{-}50 \text{ lbs N})$ Soil publication #0.565 |
| Dry beans | <input type="checkbox"/> CSUCE Published Fertilizer Suggestions <input type="checkbox"/> Adjacent State CE-Published Fertilizer Suggestions <input type="checkbox"/> CNMP Method that meets USDA-NRCS standards <input type="checkbox"/> CO NRCS NMP guidelines <input checked="" type="checkbox"/> Department-approved Method | Non-irrigated Inoculated - 40 lbs N/acre Non-irrigated Non-inoculated - 70 lbs N/acre Irrigated crops Yield Goal (lbs/a) X .05 NDSU SF-720 |

4) NUTRIENT BUDGET INFORMATION

Formulas for calculating nutrient budgets

- ☐ CSUCE Published Fertilizer Suggestions
- ☐ Adjacent State CE-Published Fertilizer Suggestions
- ☐ CNMP Method that meets USDA-NRCS standards
- ☐ CO NRCS NMP guidelines
- ☒ Department-approved Method

Olsen Laboratories current formulas, lbs. N/yield unit (where not otherwise specified, multiply by yield goal as presented in Appendices B and C)

Corn silage – multiply silage yield goal by 7 and use grain recommendation

Corn grain – $\frac{(0.90)(YG, \text{bu/a})}{1-(0.0008)(YG, \text{bu/a})} + 50 = \text{lb N/bu}$

Sorghum/Sudex silage – multiply silage yield goal by 6 and use grain recommendation

Sorghum/Sudex hay – multiply hay yield goal by 20 and use grain recommendation

Sorghum grain - $(YG)(1.2 \text{ N/bu}) + 30 \text{ lb N}$

Triticale silage – 10 lb N/ton

Triticale hay – 30 lb N/ton

Summer fallow wheat grain – 1.75 lbs N/bu

Continuous wheat grain – 2.0 lbs N/bu (includes nitrogen for stubble decomposition)

Spring wheat grain - $(YG)(2.4 \text{ lbs N/bu}) - (OM-1)*20$

Wheat silage – 10 lb/ton

Wheat hay – 30 lb N/ton

Small grain grazing – 40 lbs N/a (not dependent on yield goal)

Oat silage – 9 lbs N/ton

Oat hay – multiply hay yield goal by 17.5 and use grain recommendation

Oat grain – 1.0 lb N/bu

Irrigated grass – 45 lbs N/ton

Dryland grass – 30 lbs N/ton

Sugar beets – $(YG)(9 \text{ lbs N/ton}) - 30*\%OM - \text{Residual N} * 1.67(2' \text{ soil sample})$

Millet – 1.5 lb N/bu

Sunflower – 0.06 lb N/lb

Dry beans – $(YG, \text{bu})(2.0 \text{ lb N/bu}) (+20 \text{ lbs N for kidney beans, } -30 \text{ lbs N if inoculated, } +30 \text{ lbs N on sandy soils})$

4) NUTRIENT BUDGET INFORMATION

Formulas for calculating nutrient budgets:

- ☐ CSUCE Published Fertilizer Suggestions
- ☐ Adjacent State CE-Published Fertilizer Suggestions
- ☐ CNMP Method that meets USDA-NRCS standards
- ☐ CO NRCS NMP guidelines
- ☒ Department-approved Method

ServiTech Laboratories current formulas, lbs. N/yield unit (multiply by yield goal as presented in Appendices B and C)

Corn silage - 10 lbs. N/Ton
Corn grain - 1.3 lb N/bu
Sorghum silage - 9 lb N/ton
Sorghum hay - 25 lb N/ton
Sorghum grain - 1.2 lb N/bu
Sudex silage - 7.5 lb N/ton
Sudex hay - 25 lb N/ton
Triticale silage - 10 lb N/ton
Wheat silage - 10 lb N/ton
Winter wheat grain - 1.75 lbs N/bu
Spring wheat grain - 2.0 lbs N/bu
Small grain hay (triticale) - 26 lb N/ton
Oat silage - 12 lb N/ton
Oat hay - 25 lb N/ton
Oat grain - 1.0 lb N/bu
Pasture/Grass/Native grass - 40 lbs N/ton
Sugar beets - 7.5 lbs N/ton
Millet - 1.7 lb N/bu
Sunflower - 0.05 lb N/lb
Dry beans - 0.04 lb N/lb

4) NUTRIENT BUDGET INFORMATION

Formulas for calculating nutrient budgets:

Midwest Laboratories current formulas, lbs. N/yield unit (multiply by yield goal as presented in Appendices B and C)

Corn silage – 9.5 lbs. N/Ton

Corn grain – 1.3 lb N/bu

Sorghum silage – 7 lb N/ton

Sorghum grain - 1.3 lb N/bu

Sudex hay – 15 lb/ton

Triticale silage – convert yield to grain, use grain recommendation

Triticale grain – 1.5 lb N/bu

Winter wheat grain – 2.3 lbs N/bu

Wheat silage – convert yield to grain, use grain recommendation

Oat grain – 1.2 lb N/bu

Oat silage - convert yield to grain, use grain recommendation

Pasture/Grass/Native grass – 40 lbs N/ton

Sugar Beets – 8.5 lb N/ton

Millet – 1.6 lbs N/bu

Sunflower – 0.06 lbs N/lb

Dry beans – 0.4 lbs N/bu

Nitrogen Credits

Available Nitrogen in Wastewater (CSU Bulletin 568A, plus personal communication)

1st year N availability in wastewater, sprinkler applied ($\text{Organic N} * 30\%$) + ($\text{NH}_4\text{-N} * 55\%$)

1st year N availability in wastewater, flood applied ($\text{Organic N} * 30\%$) + ($\text{NH}_4\text{-N} * 78\%$)

2nd year N availability in wastewater ($\text{Organic N} * 10\%$)

Available Nitrogen in Manure (minimum values)

1st year N availability in manure ($\text{Organic N} * 25\%$) + ($\text{NH}_4\text{-N} * \% \text{ available below}$)

2nd year N availability in manure ($\text{Organic N} * 10\%$)

Available Nitrogen in Compost (minimum values)

1st year N availability in manure ($\text{Organic N} * 20\%$) + ($\text{NH}_4\text{-N} * \% \text{ available below}$)

2nd year N availability in manure ($\text{Organic N} * 10\%$)

NH₄-N % available, solid manure and slurry (UN NebGuide G1335).

Inject or immediate incorporation – 95%

Incorporate within 1 day – 50-70%

Incorporate 2-5 days – 0-50%

Incorporate >5 days – 0%

The laboratory's plant available nutrient schedule may also be used.

In the near future these mineralization factors may change, and this nutrient management plan will use the revised values from CSU. In fields which receive a similar amount of manure or wastewater each year, the 2 year mineralization rate may be added together and credited all in one year for simplicity.

| | |
|---------------------------------------|-----------------|
| Legume Credit- Previous crop, alfalfa | |
| >80% stand | 100-140 lbs N/A |
| 60-80% stand | 60-100 lbs N/A |
| <60% stand | 30-60 lbs N/A |

Alfalfa protein to be used in the absence of a forage test (CSU no. 0.565)

| Maturity | % Crude Protein | % N |
|-------------|-----------------|---------|
| Pre-bud | 22-24 | 3.5-3.8 |
| Bud | 20-22 | 3.2-3.5 |
| Early bloom | 17-19 | 2.7-3.0 |
| Midbloom | 14-16 | 2.2-2.6 |
| Full bloom | <14 | <2.2 |

Additional nitrogen needs

Crop decomposition

Up to 20 lbs/A additional nitrogen may need to be applied to carbonaceous crop residues.

Starter fertilizer

Regardless of the recommendations for nutrient application, up to 35 lbs of N and 35 lbs P₂O₅ may be added as a starter fertilizer at or just prior to planting in order to ensure nutrient availability to seedlings, promoting a more vigorous plant more capable of utilizing nutrients already in the soil. Any commercial fertilizer applied will be counted towards the total recommendation and subtracted from the gross recommendation in the N credit section ("other") of the rate determination sheet. If 35 lbs N are not required to grow the crop, this amount of starter will still be used.

Small grain grazing

Where small grains are fall grazed, additional nutrient needs based upon animal intake or a flat rate (30-50 lbs N/a) may be applied as outlined in the formulas for CSU and Olsen Lab.

In Season N adjustments

The formulas provided represent the maximum amount of N to be applied with advanced planning. It is not uncommon for nitrogen rates to be adjusted during the growing season. The following outlines procedures which may be used to make in season adjustments. Only one test will be used at any given time of plant growth to provide a recommendation. However, additional tests may be used at other stages of crop growth. For instance, it is possible that a soil test at side dressing could indicate the soil is likely to have enough nitrogen to grow a crop, but a tissue test at the reproductive phase of growth could show the plant is now deficient in nitrogen and needs more N.

Pre-Sidedress Nitrate Test (PSNT)

1 foot soil samples are analyzed for nitrate when corn is 6 to 12" tall. Guidance documents from Cooperative Extension, either from CSU or from a surrounding state, will be used to interpret results.

Tissue testing

Plant samples will be analyzed for nitrogen at the appropriate time, and from the appropriate location on the plant for the given crop. The results will be compared with expected nitrogen content for the plant at the specified growth stage. Deficiencies will be managed with additional N.

Leaf chlorophyll meters & near infrared sensors

There are a number of meters on the market which detect the amount of chlorophyll in leaves. By comparing the chlorophyll meter readings from the reference strips to those from the rest of the field, N sufficiency and the need for additional N can be determined. Pennsylvania State University's tool may be used at first side dress when the corn is at the V6-V8 growth stages (Fact Sheet 53: *The Early Season Chlorophyll Meter Test for Corn*) and Purdue University's tool may be used later in the season when the crop is at the V8-V12 growth stages through pollination (Fact Sheet: AY-317-W, *Determining Nitrogen Fertilizer Side dress Application Needs in Corn Using a Chlorophyll Meter*). Interpretation of NIR sensors will be made with the latest available data.

Visual analysis

Visual symptoms are an excellent diagnostic tool to determine nutrient limitations in crop fields. The visual characteristics displayed when plants are nutrient deficient vary by plant species and variety, stage of growth, and severity of the deficiency, and they are well documented and available as a reference from numerous Extension and industry sources. Visual symptoms of nitrogen deficiency may be used to adjust nitrogen recommendations. Many factors will be taken into account to determine the need for nitrogen, including but not limited to unusual weather conditions, previous crop history, source and amount of nitrogen already applied, crop stage of growth, soil physical properties, disease, insect, herbicide injury, and other factors related to root growth. Typically 20-40 lbs N will be recommended.

Nitrogen reference strip

Several reference strips are established through the field where more than enough nitrogen has been applied and is known to not be limiting. These strips are established for comparison to potential problem spots in the field. It is useful to have reference strips when interpreting soil tests and tissue tests. It is crucial that reference strips be established for a chlorophyll meter be calibrated for each field, previous crop, hybrid, fertilizer and/or manure application and differing soil types. If reference strips are utilized, they will be 12,000 square feet for each 60 acres of crop of each hybrid. If the reference strip is developed using commercial fertilizer, it will receive 10-25% above the recommended rate for the field (Purdue University Fact Sheet AY-317-W), and if manure is used to produce the reference strip, it will be applied at 100% above the recommended rate (Iowa State University Fact Sheet PM 2026, *Sensing Nitrogen Stress in Corn*). This latter rate is appropriate because there are many sources of variability when using manure, and the reference strip must be fully fertilized.

APPENDIX E

NUTRIENT MANAGEMENT PLAN TERMS

5) COLORADO PHOSPHORUS INDEX RISK ASSESSMENT

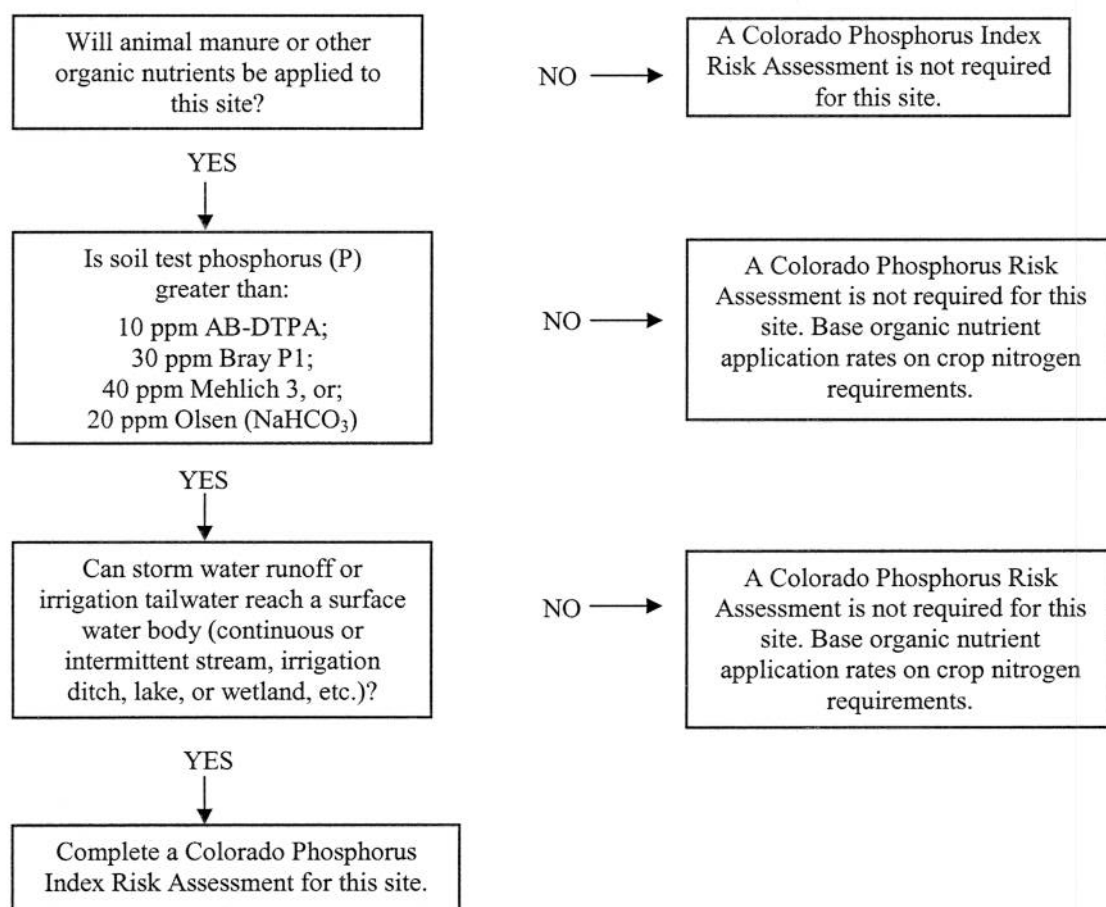
Results from the assessment are provided on the Rate Determination Sheets in Appendix F.

5) PHOSPHORUS AND NITROGEN TRANSPORT

Application rates for manure and process wastewater applied to land application sites minimize phosphorus and nitrogen transport from the application sites to surface waters. An initial assessment of the potential for phosphorus and nitrogen transport risk to surface water will be made prior to manure or process wastewater being applied to an application site. [Regulation No. 61.17(8)(b)(xii)(B)]

There is currently no published tool suitable for assessing nitrogen transport risk. Phosphorus and nitrogen transport risk will be assessed using the Colorado Phosphorus Index Risk Assessment.

The following flow chart will be used to determine if a phosphorus risk assessment must be completed for a land application site:



5) PHOSPHORUS AND NITROGEN TRANSPORT (continued)

For land application fields that require a Colorado Phosphorus Index Risk Assessment to be completed, the following applicable best management practices will be incorporated:

- (A) Phosphorus-based manure and process wastewater application rates may be made to application sites where the risk of off-site phosphorus transport is scored as high.
- (B) No application of manure or process wastewater will be made to land application sites where the risk of off-site phosphorus transport is rated as very high¹.
- (C) No application of manure or process wastewater will be made to a land application site where the risk of off-site nitrogen transport to surface water is not minimized.
- (D) Where a multi-year phosphorus application was made to a land application site, no additional manure or process wastewater will be applied to the same site in subsequent years until the applied phosphorus has been removed from the site via harvest and crop removal.

¹ Where the initial assessment of a land application site scores very high, the facility has a three-year period within which to manage the site for the purpose of lowering the phosphorus transport risk assessment rating to high or lower. During this period, manure or process wastewater may be applied to the site at either nitrogen- or phosphorus-based rates.

After completing an initial assessment of the potential for phosphorus and/or nitrogen transport from a land application site to surface water, additional assessments will be made every five years or at the frequency described below, whichever is sooner:

| Cause for Re-Assessment | Frequency |
|--|--|
| Where a crop management change has occurred | For phosphorus - Assess within one year after such a change would reasonably result in an increase in the transport risk assessment score. For nitrogen – Assess within one year after such a change would reasonably result in the nitrogen transport to surface water not being minimized. |
| Where a phosphorus transport risk assessment score was very high | Assess phosphorus transport risk within six months of intending to apply manure or process wastewater, except where the initial assessment is scored as very high, then there shall be a three-year period within which to manage the site for the purpose of lowering the phosphorus transport risk assessment rating to high or less. During this period, manure or process wastewater may be applied to the site at either nitrogen- or phosphorus-based rates. |
| Where a nitrogen transport risk assessment reveals that nitrogen transport to surface water is not minimized | Assess nitrogen transport risk within six months of intending to apply manure or process wastewater. |

ASSOCIATED RECORDS:

- 1) Copies of phosphorus/nitrogen transport risk assessments are maintained on-site.

APPENDIX F

NUTRIENT MANAGEMENT PLAN TERMS

5) FIELD NUTRIENT BALANCE CALCULATIONS

See Rate Determination Sheets

The facility uses manure on a couple of fields each year, but not on all of them. Wastewater may be applied to fields 4-8. Recommendations were made for manure on fields 1-3, and for wastewater and manure on fields 4-8. The recommendations presented in the NMP are not additive. On a year by year basis, adjustments will be made depending upon how much manure will be applied. When manure is applied, approximately 20 tons per acre is applied, with the remainder of the nitrogen requirements being met through fertilizer and/or wastewater applications.

Corners have no recommendations currently developed. If manure is applied to these fields, they will be soil sampled, and recommendations will be developed at that time.

The planned crop rotation is:

| Field | 2012 | 2013 | 2014 | 2015 | 2016 |
|-------|---------|---------|---------|---------|---------|
| 1 | Corn | Corn | Corn | Alfalfa | Alfalfa |
| 2 | Corn | Corn | Corn | Alfalfa | Alfalfa |
| 3 | Corn | Corn | Alfalfa | Alfalfa | Alfalfa |
| 4 | Corn | Alfalfa | Alfalfa | Alfalfa | Alfalfa |
| 5 | Alfalfa | Alfalfa | Alfalfa | Alfalfa | Alfalfa |
| 6 | Alfalfa | Alfalfa | Alfalfa | Corn | Corn |
| 7 | Alfalfa | Alfalfa | Alfalfa | Corn | Corn |
| 8 | Alfalfa | Alfalfa | Alfalfa | Corn | Corn |

Field: 1
Farm: Booth-Milliken

1. Field Information:

Crop: Corn Crop Year: 2012 Acres: 141
 Soil name/texture: Loam Previous Crop: Alfalfa

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 11.1 P (Olsen), ppm 12 K (NH₄OAc), ppm 203 pH 8
 P-Index Score 9 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|---|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 238 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 40 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 40 |

3. Nitrogen Credits:

| | | | |
|--|------|---------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 11.1 | ppm NO ₃ | 40 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied 0 | 0 | 10% avail | 0 |
| e) Other: alfalfa credit | | | 65 |
| f) Total nitrogen credit | | | 105 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|----|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 209 | 40 |
|--|-----|----|

Sample ID: Milliken Lab #: 19255

Application Method: Broadcast manure w/o incorp

| | | |
|---|-----------------------|-----|
| b) Expected NH ₃ -N volatilization | 100 % | |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton | |
| d) Expected mineralization rate | 25 % | |
| e) Organic N available from manure | 18.2 lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/Ton | 4.6 |
| Recommended manure application rate (a/f) | Ton/acre, max allowed | 46 |

Manure, recommended 20.0 tons/a
 fertilizer, recommended 117.0 lbs N/a

| | | |
|---|-----------------------|---|
| g) P ₂ O ₅ available 9.52 lbs/Ton | Analysis 11.9 lbs/Ton | lbs P ₂ O ₅ /acre 190 |
|---|-----------------------|---|

h) Additional P₂O₅ needs from commercial fertilizer -150 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring



AGPROessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

1

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: through 2014 Previous Crop:

Soil test results Date N(as NO₃-N), ppm P (Olsen), ppm K (NH₄OAc), ppm pH
11/2/2011 11.1 12 203 8

P-Index Score Application rate based upon

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <input type="text" value="238"/> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 40 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 40 |

3. Nitrogen Credits:

| | | |
|---|---|---------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="11.1"/> ppm NO ₃ | <input type="text" value="40"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| <input type="text" value="Previous Year LBS Organic N Applied"/> <input type="text" value="400"/> 10% avail | | <input type="text" value="40"/> |
| e) Other: none | | |
| f) Total nitrogen credit | | <input type="text" value="80"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|----------------------------------|---------------------------------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <input type="text" value="234"/> | <input type="text" value="40"/> |
|--|----------------------------------|---------------------------------|

Sample ID: Lab #:

Application Method:

| | | |
|--|---|--|
| b) Expected NH ₃ -N volatilization | <input type="text" value="100"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <input type="text" value="4.6"/> lbs/Ton | |
| Recommended manure application rate (a/f) | <input type="text" value="51"/> Ton/acre, max allowed | |
| | Manure, recommended | <input type="text" value="20.0"/> t/a |
| | fertilizer, recommended | <input type="text" value="142.0"/> lbs N/a |
| g) P ₂ O ₅ available | <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <input type="text" value="-150"/> lbs/acre | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



Field:

1

Farm:

Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2015 Acres: 141
Soil name/texture: Loam through 2016 Previous Crop: Corn

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 11.1 P (Olsen), ppm 12 K (NH₄OAc), ppm 203 pH 8

P-Index Score 9 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 150 |
| Formula Used: ((YG*2000)*(%Protein/6.25)*(0.6))/0.66 CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 150 |

3. Nitrogen Credits:

| | | | |
|--|------|---------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 11.1 | ppm NO ₃ | 40 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied 400 | 400 | 10% avail | 40 |
| e) Other: | | | |
| f) Total nitrogen credit | | | 80 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|-----|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 194 | 150 |
|--|-----|-----|

Sample ID: Milliken Lab #: 19255

Application Method: Broadcast manure w/o incorp

| | | |
|---|--------------|-------------|
| b) Expected NH ₃ -N volatilization | 100 % | |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton | |
| d) Expected mineralization rate | 25 % | |
| e) Organic N available from manure | 18.2 lbs/Ton | |
| f) Total available N [(c x {1-b})] + [d x e] | lbs/Ton | 4.6 |
| Recommended manure application rate (a/f) | | Ton/acre 43 |

g) P₂O₅ available 9.52 lbs/Ton Analysis 11.9 lbs/Ton lbs P₂O₅/acre 406

h) Additional P₂O₅ needs from commercial fertilizer -256 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Manure not likely to be applied, but if so, in the fall of the 2015 crop year, via spreader truck

Manure Application - Rate Determination Sheet



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DEVELOPERS OF AGRICULTURE

Field:

2

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 9.4 P (Olsen), ppm 35 K (NH₄OAc), ppm 211 pH 8

P-Index Score Application rate based upon

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|----------------------------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <input type="text" value="238"/> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | <input type="text" value="314"/> | <input type="text" value="0"/> |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | <input type="text" value="314"/> | <input type="text" value="0"/> |

3. Nitrogen Credits:

| | | |
|---|--|---------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="9.4"/> ppm NO ₃ | <input type="text" value="34"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied <input type="text" value="0"/> | 10% avail | <input type="text" value="0"/> |
| e) Other: alfalfa credit | | <input type="text" value="65"/> |
| f) Total nitrogen credit | | <input type="text" value="99"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

a) Total nutrient need minus Total nutrient credit (lb/acre)

Sample ID: Lab #:

Application Method:

| | | |
|--|---|--|
| b) Expected NH ₃ -N volatilization | <input type="text" value="100"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <input type="text" value="4.6"/> lbs/Ton | |
| Recommended manure application rate (a/f) | <input type="text" value="47"/> Ton/acre, max allowed | |
| | Manure, recommended | <input type="text" value="20.0"/> tons/a |
| | fertilizer, recommended | <input type="text" value="123.2"/> lbs N/a |
| g) P ₂ O ₅ available <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <input type="text" value="-190"/> lbs/acre | |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

2

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: through 2014 Previous Crop:
Soil test results Date 11/2/2011 N(as NO₃-N), ppm 9.4 P (Olsen), ppm 35 K (NH₄OAc), ppm 211 pH 8
P-Index Score Application rate based upon

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <input type="text" value="238"/> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | |
|---|--|---------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="9.4"/> ppm NO ₃ | <input type="text" value="38"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied <input type="text" value="400"/> | 10% avail | <input type="text" value="40"/> |
| e) Other: | | |
| f) Total nitrogen credit | | <input type="text" value="78"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|----------------------------------|--------------------------------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <input type="text" value="236"/> | <input type="text" value="0"/> |
|--|----------------------------------|--------------------------------|

Sample ID: Lab #:

Application Method:

| | | |
|--|--|--|
| b) Expected NH ₃ -N volatilization | <input type="text" value="100"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <input type="text" value="4.6"/> lbs/Ton | |
| Recommended manure application rate (a/f) | Ton/acre, max allowed | <input type="text" value="52"/> |
| | Manure, recommended | <input type="text" value="20.0"/> tons/a |
| | fertilizer, recommended | <input type="text" value="144.4"/> lbs N/a |
| g) P ₂ O ₅ available <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <input type="text" value="-190"/> lbs/acre | |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



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DEVELOPERS OF AGRICULTURE

Field:

2

Farm:

Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2015 Acres: 103
Soil name/texture: Loam through 2016 Previous Crop: Corn
Soil test results Date 11/2/2011 N(as NO₃-N), ppm 9.4 P (Olsen), ppm 35 K (NH₄OAc), ppm 211 pH 8
P-Index Score 10 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 0 |
| Formula Used: (((YG*2000)*(%Protein/6.25)*(0.6))/0.66) CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 0 |

3. Nitrogen Credits:

| | | | |
|--|-----|---------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 9.4 | ppm NO ₃ | 34 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied | 400 | 10% avail | 40 |
| e) Other: | | | |
| f) Total nitrogen credit | | | 74 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|--------------|-----|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 200 | 0 |
| Sample ID: Milliken Lab #: 19255 | | |
| Application Method: Broadcast manure w/o incorp | | |
| b) Expected NH ₃ -N volatilization | 100 % | |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton | |
| d) Expected mineralization rate | 25 % | |
| e) Organic N available from manure | 18.2 lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/Ton | 4.6 |
| Recommended manure application rate (a/f) | Ton/acre | 44 |

g) P₂O₅ available 9.52 lbs/Ton Analysis 11.9 lbs/Ton lbs P₂O₅/acre 419

h) Additional P₂O₅ needs from commercial fertilizer -419 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Manure not likely to be applied, but if so, in fall for 2015 crop, using spreader truck.

Manure Application - Rate Determination Sheet



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Field:

3

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: through 2013 Previous Crop:

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 20.6 P (Olsen), ppm 7 K (NH₄OAc), ppm 110 pH 8

P-Index Score N/A (low soil P) Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <u>238</u> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 80 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 80 |

3. Nitrogen Credits:

| | | |
|---|---|----------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="20.6"/> ppm NO ₃ | <input type="text" value="74"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| <input type="text" value="Previous Year LBS Organic N Applied"/> <input type="text" value="400"/> | 10% avail | <input type="text" value="40"/> |
| e) Other: | | |
| f) Total nitrogen credit | | <input type="text" value="114"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|----------------------------------|---------------------------------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <input type="text" value="200"/> | <input type="text" value="80"/> |
|--|----------------------------------|---------------------------------|

Sample ID: Milliken Lab #: 19255

Application Method:

| | | |
|---|---|--|
| b) Expected NH ₃ -N volatilization | <input type="text" value="100"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N [(c x {1-b})] + [d x e] | <input type="text" value="4.6"/> lbs/Ton | |
| Recommended manure application rate (a/f) | <input type="text" value="44"/> Ton/acre, max allowed | |

Manure, recommended 20.0 tons/a
fertilizer, recommended 107.8 lbs N/a

| | | |
|--|--|--|
| g) P ₂ O ₅ available <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |
|--|--|--|

h) Additional P₂O₅ needs from commercial fertilizer lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



Field: 3
Farm: Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2014 Acres: 146
Soil name/texture: Loam through 2016 Previous Crop: Corn

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 20.6 P (Olsen), ppm 7 K (NH₄OAc), ppm 110 pH 8

P-Index Score N/A (low soil P) Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 150 |
| Formula Used: ((YG*2000)*(%Protein/6.25)*(0.6))/0.66 CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 150 |

3. Nitrogen Credits:

| | | | |
|--|------|---------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 20.6 | ppm NO ₃ | 74 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied | 400 | 10% avail | 40 |
| e) Other: | | | |
| f) Total nitrogen credit | | | 114 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|-----|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 160 | 150 |
|--|-----|-----|

Sample ID: Milliken Lab #: 19255

Application Method: Broadcast manure w/o incorp

| | | |
|---|--------------|----------|
| b) Expected NH ₃ -N volatilization | 100 % | |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton | |
| d) Expected mineralization rate | 25 % | |
| e) Organic N available from manure | 18.2 lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/Ton | 4.6 |
| Recommended manure application rate (a/f) | | 35 |
| | | Ton/acre |

g) P₂O₅ available 9.52 lbs/Ton Analysis 11.9 lbs/Ton lbs P₂O₅/acre 334

h) Additional P₂O₅ needs from commercial fertilizer -184 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Manure not likely to be applied, but if so, in fall for 2014 crop, using spreader truck.

Wastewater Application - Rate Determination Sheet



Field: 4
Farm: Booth-Milliken

1. Field Information:

Crop: Corn Crop Year: 2012 Acres: 143
Soil name/texture: Loam Previous Crop: Corn

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 29.1 P (Olsen), ppm 56 K (NH₄OAc), ppm 337 pH 7.9

P-Index Score 10 Application rate based upon Nitrogen

2. Nutrient Needs:

| | | | |
|---|-----------------------------|-------------|-------------|
| | | N (lb/acre) | P2O5 (lb/a) |
| a) Expected yield (avg. of last 5 yrs + 5%) | 238 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | | |
| c) Special nutrient needs above recommendations | | | |
| d) Total nutrient needs | | 314 | 0 |

3. Nitrogen Credits:

| | | |
|--|--------------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 29.1 ppm NO ₃ | 105 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= | 0 ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied | 400 10% avail | 40 |
| e) Other: | | |
| f) Total nitrogen credit | | 145 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 169 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|---|-------------------|------------------|
| b) Expected NH ₃ -N volatilization | 45 % | |
| c) NH ₄ -N available from manure | 0.75 lbs/1000 gal | |
| d) Expected mineralization rate | 30 % | |
| e) Organic N available from manure | 0.38 lbs/1000 gal | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/1000 gal | 0.5 |
| Recommended manure application rate (a/f) | | Gal/acre 321,443 |
| | | ac-in/acre 11.7 |

g) P2O5 available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P2O5/acre 95

h) Additional P2O5 needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P2O5 lbs/ton x 0.6 or 0.8 = available P2O5)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
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Field:

4

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 29.1 P (Olsen), ppm 56 K (NH₄OAc), ppm 337 pH 7.9

P-Index Score Application rate based upon

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <input type="text" value="238"/> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | |
|---|---|----------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="29.1"/> ppm NO ₃ | <input type="text" value="105"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied <input type="text" value="400"/> | 10% avail | <input type="text" value="40"/> |
| e) Other: | | |
| f) Total nitrogen credit | | <input type="text" value="145"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|----------------------------------|--------------------------------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <input type="text" value="169"/> | <input type="text" value="0"/> |
|--|----------------------------------|--------------------------------|

Sample ID: Lab #:

Application Method:

| | | |
|---|---|---------------------------------|
| b) Expected NH ₃ -N volatilization | <input type="text" value="100"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N [(c x {1-b})] + [d x e] | <input type="text" value="4.6"/> lbs/Ton | |
| Recommended manure application rate (a/f) | Ton/acre, max allowed | <input type="text" value="37"/> |

Manure, recommended 20.0 tons/a
fertilizer, recommended 77.2 lbs N/a

| | | |
|--|--|--|
| g) P ₂ O ₅ available <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |
|--|--|--|

h) Additional P₂O₅ needs from commercial fertilizer lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Wastewater Application - Rate Determination Sheet



Field: 4
Farm: Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2013 Acres: 143
Soil name/texture: Loam through 2016 Previous Crop: Corn

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 29.1 P (Olsen), ppm 56 K (NH₄OAc), ppm 337 pH 7.9

P-Index Score 10 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P2O5 (lb/a) |
|--|-------------|-------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 0 |
| Formula Used: (((YG*2000)*(%Protein/6.25)*(0.6))/0.66) CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 0 |

3. Nitrogen Credits:

| | | |
|--|--------------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 29.1 ppm NO ₃ | 105 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= | 0 ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied 400 10% avail | | 40 |
| e) Other: | | |
| f) Total nitrogen credit | | 145 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 129 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|---|-------------------|------------------|
| b) Expected NH ₃ -N volatilization | 45 % | |
| c) NH ₄ -N available from manure | 0.75 lbs/1000 gal | |
| d) Expected mineralization rate | 30 % | |
| e) Organic N available from manure | 0.38 lbs/1000 gal | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/1000 gal | 0.5 |
| Recommended manure application rate (a/f) | | Gal/acre 245,208 |
| | | ac-in/acre 8.9 |

g) P2O5 available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P2O5/acre 73

h) Additional P2O5 needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P2O5 lbs/ton x 0.6 or 0.8 = available P2O5)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Wastewater Application - Rate Determination Sheet



Field: 5
Farm: Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2012 Acres: 146
Soil name/texture: Loam through 2016 Previous Crop: Corn

Soil test results Date 3/7/2012 N(as NO₃-N), ppm 21.8 P (Olsen), ppm 72 K (NH₄OAc), ppm 355 pH 8

P-Index Score 7 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 0 |
| Formula Used: (((YG*2000)*(%Protein/6.25)*(0.6))/0.66) CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 0 |

3. Nitrogen Credits:

| | | |
|--|--------------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 21.8 ppm NO ₃ | 78 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied 400 10% avail | | 40 |
| e) Other: | | |
| f) Total nitrogen credit | | 118 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 155 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|---|-------------------|------------------|
| b) Expected NH ₃ -N volatilization | 45 % | |
| c) NH ₄ -N available from manure | 0.75 lbs/1000 gal | |
| d) Expected mineralization rate | 30 % | |
| e) Organic N available from manure | 0.38 lbs/1000 gal | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/1000 gal | 0.5 |
| Recommended manure application rate (a/f) | | Gal/acre 295,122 |
| | | ac-in/acre 10.7 |

g) P₂O₅ available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P₂O₅/acre 87

h) Additional P₂O₅ needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Wastewater Application - Rate Determination Sheet



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Field:

6

Farm:

Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2012 Acres: 82
Soil name/texture: Loam through 2014 Previous Crop: Alfalfa

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 10.3 P (Olsen), ppm 103 K (NH₄OAc), ppm 397 pH 8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P2O5 (lb/a) |
|---|-------------|-------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <u>5.23</u> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | <u>274</u> | <u>0</u> |
| Formula Used: $((Y \times 2000) \times (\% \text{Protein} / 6.25) \times (0.6)) / 0.66$ CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | <u>274</u> | <u>0</u> |

3. Nitrogen Credits:

| | | |
|---|---------------------------------|-----------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <u>10.3</u> ppm NO ₃ | <u>37</u> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <u>0</u> | <u>0</u> ppm NO ₃ | <u>0</u> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied <u>0</u> 10% avail | | <u>0</u> |
| e) Other: | | |
| f) Total nitrogen credit | | <u>37</u> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|------------|----------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <u>237</u> | <u>0</u> |
|--|------------|----------|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|--|--------------------------|-------------------------|
| b) Expected NH ₃ -N volatilization | <u>45</u> % | |
| c) NH ₄ -N available from manure | <u>0.75</u> lbs/1000 gal | |
| d) Expected mineralization rate | <u>30</u> % | |
| e) Organic N available from manure | <u>0.38</u> lbs/1000 gal | |
| f) Total available N $([c \times \{1-b\}] + [d \times e])$ | <u>0.5</u> lbs/1000 gal | |
| Recommended manure application rate (a/f) | | <u>449,728</u> Gal/acre |
| | | <u>16.3</u> ac-in/acre |

g) P2O₅ available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P2O₅/acre 133

h) Additional P2O₅ needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P2O₅ lbs/ton x 0.6 or 0.8 = available P2O₅)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
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Field:

6

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 10.3 P (Olsen), ppm 103 K (NH₄OAc), ppm 397 pH 8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <u>238</u> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | |
|---|---|------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="10.3"/> ppm NO ₃ | <u>37</u> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <u>0</u> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied <input type="text" value="0"/> 10% avail | | <u>0</u> |
| e) Other: alfalfa credit | | <u>65</u> |
| f) Total nitrogen credit | | <u>102</u> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|------------|----------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <u>212</u> | <u>0</u> |
|--|------------|----------|

Sample ID: Milliken Lab #: 19255

Application Method:

| | | |
|---|---------------------------------|--|
| b) Expected NH ₃ -N volatilization | <u>100</u> % | |
| c) NH ₄ -N available from manure | <u>1.14</u> lbs/Ton | |
| d) Expected mineralization rate | <u>25</u> % | |
| e) Organic N available from manure | <u>18.2</u> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <u>4.6</u> lbs/Ton | |
| Recommended manure application rate (a/f) | <u>47</u> Ton/acre, max allowed | |
| | Manure, recommended | <u>20.0</u> tons/a |
| | fertilizer, recommended | <u>119.9</u> lbs N/a |
| g) P ₂ O ₅ available <u>9.52</u> lbs/Ton Analysis <u>11.9</u> lbs/Ton | | <u>190</u> lbs P ₂ O ₅ /acre |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <u>-190</u> lbs/acre | |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



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Field:

6

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 10.3 P (Olsen), ppm 103 K (NH₄OAc), ppm 397 pH 8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <input type="text" value="238"/> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | |
|---|---|---------------------------------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="10.3"/> ppm NO ₃ | <input type="text" value="37"/> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= <input type="text" value="0"/> | <input type="text" value="0"/> ppm NO ₃ | <input type="text" value="0"/> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| <input type="text" value="Previous Year LBS Organic N Applied"/> <input type="text" value="400"/> | 10% avail | <input type="text" value="40"/> |
| e) Other: | | |
| f) Total nitrogen credit | | <input type="text" value="77"/> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|----------------------------------|--------------------------------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <input type="text" value="237"/> | <input type="text" value="0"/> |
|--|----------------------------------|--------------------------------|

Sample ID: Lab #:

Application Method:

| | | |
|--|--|--|
| b) Expected NH ₃ -N volatilization | <input type="text" value="30"/> % | |
| c) NH ₄ -N available from manure | <input type="text" value="1.14"/> lbs/Ton | |
| d) Expected mineralization rate | <input type="text" value="25"/> % | |
| e) Organic N available from manure | <input type="text" value="18.2"/> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <input type="text" value="5.3"/> lbs/Ton | |
| Recommended manure application rate (a/f) | | <input type="text" value="44"/> |
| | Ton/acre, max allowed | |
| | Manure, recommended | <input type="text" value="20.0"/> tons/a |
| | fertilizer, recommended | <input type="text" value="144.9"/> lbs N/a |
| g) P ₂ O ₅ available <input type="text" value="9.52"/> lbs/Ton | Analysis <input type="text" value="11.9"/> lbs/Ton | lbs P ₂ O ₅ /acre <input type="text" value="190"/> |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <input type="text" value="-190"/> lbs/acre | |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Wastewater Application - Rate Determination Sheet



Field: 7
Farm: Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2012 Acres: 69
Soil name/texture: Loam through 2014 Previous Crop: Alfalfa

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 14.3 P (Olsen), ppm 86 K (NH₄OAc), ppm 425 pH 7.8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P2O5 (lb/a) |
|--|-------------|-------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 0 |
| Formula Used: (((YG*2000)*(%Protein/6.25)*(0.6))/0.66) CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 0 |

3. Nitrogen Credits:

| | | |
|--|--------------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 14.3 ppm NO ₃ | 51 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied 0 10% avail | | 0 |
| e) Other: | | |
| f) Total nitrogen credit | | 51 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 222 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|---|-------------------|------------------|
| b) Expected NH ₃ -N volatilization | 45 % | |
| c) NH ₄ -N available from manure | 0.75 lbs/1000 gal | |
| d) Expected mineralization rate | 30 % | |
| e) Organic N available from manure | 0.38 lbs/1000 gal | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/1000 gal | 0.5 |
| Recommended manure application rate (a/f) | | Gal/acre 422,378 |
| | | ac-in/acre 15.3 |

g) P2O5 available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P2O5/acre 125

h) Additional P2O5 needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P2O5 lbs/ton x 0.6 or 0.8 = available P2O5)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Manure Application - Rate Determination Sheet



AGPROprofessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

7

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 14.3 P (Olsen), ppm 86 K (NH₄OAc), ppm 425 pH 7.8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|---|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 238 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | | |
|--|------|---------------------|-----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 14.3 | ppm NO ₃ | 51 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied 0 | 0 | 10% avail | 0 |
| e) Other: alfalfa | | | 65 |
| f) Total nitrogen credit | | | 116 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

a) Total nutrient need minus Total nutrient credit (lb/acre) 198 0

Sample ID: Milliken Lab #: 19255

Application Method:

| | |
|---|---|
| b) Expected NH ₃ -N volatilization | 100 % |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton |
| d) Expected mineralization rate | 25 % |
| e) Organic N available from manure | 18.2 lbs/Ton |
| f) Total available N ([c x {1-b}] + [d x e]) | 4.6 lbs/Ton |
| Recommended manure application rate (a/f) | 43 Ton/acre, max allowed |
| Manure, recommended | 20.0 tons/a |
| fertilizer, recommended | 105.5 lbs N/a |
| g) P ₂ O ₅ available 9.52 lbs/Ton Analysis 11.9 lbs/Ton | lbs P ₂ O ₅ /acre 190 |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | -190 lbs/acre |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

7

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 14.3 P (Olsen), ppm 86 K (NH₄OAc), ppm 425 pH 7.8

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|--|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) <u>238</u> Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | | |
|--|-----------------------------------|---------------------|-----------|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | <input type="text" value="14.3"/> | ppm NO ₃ | <u>51</u> |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= | <input type="text" value="0"/> | ppm NO ₃ | <u>0</u> |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied | <input type="text" value="400"/> | 10% avail | <u>40</u> |
| e) Other: | | | |
| f) Total nitrogen credit | | | <u>91</u> |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|------------|----------|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | <u>223</u> | <u>0</u> |
|--|------------|----------|

Sample ID: Milliken Lab #: 19255

Application Method:

| | | |
|--|---------------------------------|--|
| b) Expected NH ₃ -N volatilization | <u>100</u> % | |
| c) NH ₄ -N available from manure | <u>1.14</u> lbs/Ton | |
| d) Expected mineralization rate | <u>25</u> % | |
| e) Organic N available from manure | <u>18.2</u> lbs/Ton | |
| f) Total available N ([c x {1-b}] + [d x e]) | <u>4.6</u> lbs/Ton | |
| Recommended manure application rate (a/f) | <u>49</u> Ton/acre, max allowed | |
| | Manure, recommended | <u>20.0</u> tons/a |
| | fertilizer, recommended | <u>130.5</u> lbs N/a |
| g) P ₂ O ₅ available | <u>9.52</u> lbs/Ton | Analysis <u>11.9</u> lbs/Ton |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | <u>-190</u> lbs/acre | lbs P ₂ O ₅ /acre <u>190</u> |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Wastewater Application - Rate Determination Sheet



Field: 8
Farm: Booth-Milliken

1. Field Information:

Crop: Alfalfa Crop Year: 2012 Acres: 130
Soil name/texture: Loam through 2014 Previous Crop: Alfalfa

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 7.4 P (Olsen), ppm 88 K (NH₄OAc), ppm 366 pH 7.9

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P2O5 (lb/a) |
|--|-------------|-------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 5.23 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 274 | 0 |
| Formula Used: (((YG*2000)*(%Protein/6.25)*(0.6))/0.66) CSU Soil Publication # 0.565 | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 274 | 0 |

3. Nitrogen Credits:

| | | |
|--|-------------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 7.4 ppm NO ₃ | 27 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | |
| d) Previous manure application credit (applic rate x org N x % min) | | |
| Previous Year LBS Organic N Applied 0 10% avail | | 0 |
| e) Other: | | |
| f) Total nitrogen credit | | 27 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 247 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 17434

Application method: Sprinkler

| | | |
|---|-------------------|------------------|
| b) Expected NH ₃ -N volatilization | 45 % | |
| c) NH ₄ -N available from manure | 0.75 lbs/1000 gal | |
| d) Expected mineralization rate | 30 % | |
| e) Organic N available from manure | 0.38 lbs/1000 gal | |
| f) Total available N ([c x {1-b}] + [d x e]) | lbs/1000 gal | 0.5 |
| Recommended manure application rate (a/f) | | Gal/acre 469,557 |
| | | ac-in/acre 17.0 |

g) P2O5 available 0.30 lbs/1000 gal Analysis 0.37 lbs/1000 gal lbs P2O5/acre 139
h) Additional P2O5 needs from commercial fertilizer 0 lbs/acre

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P2O5 lbs/ton x 0.6 or 0.8 = available P2O5)

Predicted method, form, and timing of application:

Applied through pivot in spring, summer or fall

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

8

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 7.4 P (Olsen), ppm 88 K (NH₄OAc), ppm 366 pH 7.9

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|---|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 238 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | | |
|--|-----|---------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 7.4 | ppm NO ₃ | 27 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied 0 | 0 | 10% avail | 0 |
| e) Other: Alfalfa | | | 65 |
| f) Total nitrogen credit | | | 92 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 222 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 19255

Application Method:

| | |
|---|---|
| b) Expected NH ₃ -N volatilization | 100 % |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton |
| d) Expected mineralization rate | 25 % |
| e) Organic N available from manure | 18.2 lbs/Ton |
| f) Total available N [(c x {1-b}) + (d x e)] | 4.6 lbs/Ton |
| Recommended manure application rate (a/f) | 49 Ton/acre, max allowed |
| Manure, recommended | 20.0 tons/a |
| fertilizer, recommended | 130.4 lbs N/a |
| g) P ₂ O ₅ available 9.52 lbs/Ton Analysis 11.9 lbs/Ton | lbs P ₂ O ₅ /acre 190 |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | -190 lbs/acre |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring

Manure Application - Rate Determination Sheet



AGPROessionals, LLC
DEVELOPERS OF AGRICULTURE

Field:

8

Farm:

Booth-Milliken

1. Field Information:

Crop: Crop Year: Acres:
Soil name/texture: Previous Crop:

Soil test results Date 11/2/2011 N(as NO₃-N), ppm 7.4 P (Olsen), ppm 88 K (NH₄OAc), ppm 366 pH 7.9

P-Index Score 11 Application rate based upon Nitrogen

2. Nutrient Needs:

| | N (lb/acre) | P ₂ O ₅ (lb/a) |
|---|-------------|--------------------------------------|
| a) Expected yield (avg. of last 5 yrs + 5%) 238 Tons, Lbs or Bu. / Acre | | |
| b) Nutrient recommendations | 314 | 0 |
| Formula Used: Olsen Laboratory Recommendations | | |
| c) Special nutrient needs above recommendations | | |
| d) Total nutrient needs | 314 | 0 |

3. Nitrogen Credits:

| | | | |
|--|-----|---------------------|----|
| a) Residual soil nitrate credit* (1 foot for grass, 2 feet for all others) | 7.4 | ppm NO ₃ | 27 |
| b) Irrigation water credit (2.7 lb N per ac-ft x ppm NO ₃ -N x ac-ft) af= 0 | 0 | ppm NO ₃ | 0 |
| c) Previous legume crop (see Table 11 in CSU Bulletin NO. 568A) | | | |
| d) Previous manure application credit (applic rate x org N x % min) | | | |
| Previous Year LBS Organic N Applied 400 | 400 | 10% avail | 40 |
| e) Other: | | | |
| f) Total nitrogen credit | | | 67 |

*if not included in 2b above. Do not use N credits twice, ie. From tables 7a-7e and here.

*residual nitrate ppm is a total value for depth indicated, or a weighted average of the top 2 feet then doubled for corn and sorghum crops

4. Recommended Nutrient Application Rate:

| | | |
|--|-----|---|
| a) Total nutrient need minus Total nutrient credit (lb/acre) | 247 | 0 |
|--|-----|---|

Sample ID: Milliken Lab #: 19255

Application Method:

| | | |
|--|---------------------------------------|---|
| b) Expected NH ₃ -N volatilization | 100 % | |
| c) NH ₄ -N available from manure | 1.14 lbs/Ton | |
| d) Expected mineralization rate | 25 % | |
| e) Organic N available from manure | 18.2 lbs/Ton | |
| f) Total available N [(c x {1-b})] + [d x e] | 4.6 lbs/Ton | |
| Recommended manure application rate (a/f) | 54 Ton/acre, max allowed | |
| | Manure, recommended 20.0 tons/a | |
| | fertilizer, recommended 155.4 lbs N/a | |
| g) P ₂ O ₅ available 9.52 lbs/Ton | Analysis 11.9 lbs/Ton | lbs P ₂ O ₅ /acre 190 |
| h) Additional P ₂ O ₅ needs from commercial fertilizer | -190 lbs/acre | |

P is 80% available when applied frequently, 60% available when applied infrequently (analysis P₂O₅ lbs/ton x 0.6 or 0.8 = available P₂O₅)

Predicted method, form, and timing of application:

Applied with spreader truck in fall or spring